

Graphene composites for enhanced drinking water purification

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The occurrence of the so called 'emerging contaminants' in worldwide surface, ground and even drinking water is current one of the most urgent challenge to be faced.[1] The European Commission has recently published the new Drinking Water Directive EU2020/21844 which regulated the quality of EU waters, aims at enhancing the public access to safe water and introduce the water safety plan approach, this asking to the water suppliers and operators to be ready to exploit new and efficient deputation technologies when required. [2]

Among nanomaterials, graphene derivatives hold great promise in this sector, mainly due to the large commercial availability, high surface area and promising results in both adsorption and filtration scenario.

Here, we report on several new technologies developed in our laboratory and based on graphene oxide (GO) and modified GO composites, for the removal of ECs from water. We describe the synthesis, characterization working mechanisms of different graphene-based materials and the removal performance towards selected ECs (including drugs and perfluorinated alkylate substances, PFAS), in comparison to that of standard materials such as granular activated carbon (GAC).

References

- [1] Richardson, S. D.; Kimura, S. Y., Water Analysis: Emerging Contaminants and Current Issues. *Analytical Chemistry* 2020, 92 (1), 473-505.
- [2] <https://eur-lex.europa.eu/eli/dir/2020/2184/oj>
- [3] Kovtun, A.; Bianchi, A.; Zambianchi, M.; Bettini, C.; Corticelli, F.; Ruani, G.; Bocchi, L.; Stante, F.; Gazzano, M.; Marforio, T. D.; Calvaresi, M.; Minelli, M.; Navacchia, M. L.; Palermo, V.; Melucci, M., Core-shell graphene oxide-polymer hollow fibers as water filters with enhanced performance and selectivity. *Faraday Discussions* 2021, 227 (0), 274-290.

Figures



Figure 1. Tap water purification by graphene enhanced materials and filters.